

Specification

Document No.: OSK-SPC-SKC6812RV

Product No.: SKC6812RV

Sample NO.: OP0274E

Description 5.0x4.8x1.6 mm 0.2W Intelligent external control surface mount SMD LED (MSL:5a)

Rev. No.: A/1

Date: 2021-03-17

| Customer approval | | | Opsco approval | | |
|---------------------------------------------------------------------------------------|--------|--------------|----------------|--------|--------------|
| Approval | Review | Confirmation | Approval | Review | Confirmation |
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| <input type="checkbox"/> Qualified <input type="checkbox"/> Disqualified Stamp | | | Stamp | | |



Change History

| Date | Rev. No. | Changes/Reason of changes | Signature |
|------------|----------|---------------------------|-----------|
| 2020-01-16 | A/0 | Initial Document | KAEN ZHOU |
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1. Product Overview :

SKC6812RV is an intelligent external control LED light source, which integrates control circuit and light-emitting circuit. Its appearance is the same as a SMD5050 side light-emitting LED bead, each component is a pixel. Pixel points contain intelligent digital interface data latch signal shaping and amplifying drive electric wheel, power supply voltage stabilization circuit, built-in constant current circuit, high precision RC oscillator. The output driver adopts patent PWM technology, which effectively guarantees high color consistency of light in the pixel points.

The data protocol being used is unipolar RZ communication mode. The 24-bit data is transmitted from the controller to DIN of the first element, and if it is accepted it is extracted pixel to pixel. After an internal data latch, the remaining data is passed through the internal amplification circuit and sent out on the DO port to the remaining pixels. The pixel is reset after the end of DIN. Using automatic shaping forwarding technology makes the number of cascaded pixels without signal transmission only limited by signal transmission speed.

The LED has a low driving voltage (which allows for environmental protection and energy saving), high brightness, scattering angle, good consistency, low power, and long life. The control circuit is integrated in the LED above.

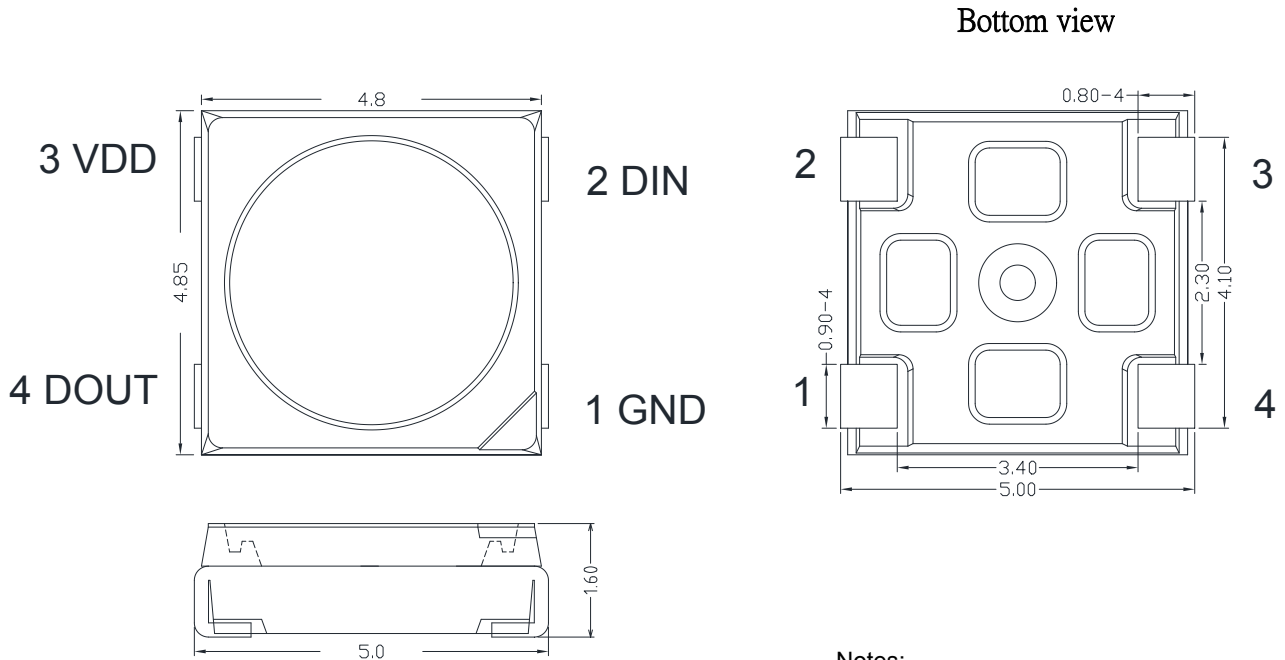
2. Main Application Field:

- Full color LED string light, LED full color module, LED super hard and soft lights, LED guardrail tube, LED appearance / scene lighting
- LED point light, LED pixel screen, LED shaped screen, a variety of electronic products, electrical equipment etc.

3. Description:

- Top SMD internal integrated high quality external control line serial cascade constant current IC;
- control circuit and the RGB chip in SMD 5050 components, to form a complete control of pixel, color mixing uniformity and consistency;
- built-in data shaping circuit, a pixel signal is received after wave shaping and output waveform distortion will not guarantee a line;
- The built-in power on reset and reset circuit, the power does not work;
- gray level adjusting circuit (256 level gray scale adjustable);
- red drive special treatment, color balance;
- line data transmission;
- plastic forward strengthening technology, the transmission distance between two points over 10M;
- Using a typical data transmission frequency of 800 Kbps, when the refresh rate of 30 frames per sec
- When the service life of the light source is 25 °C, the service life of the product is 50000h (Note: the product is under the condition of good heat dissipation).

4. Mechanical Dimensions:



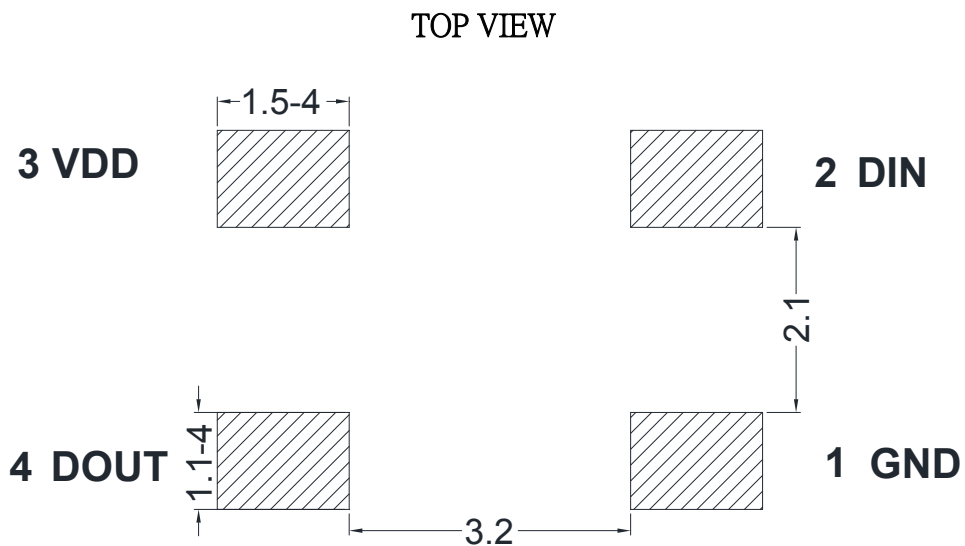
Notes:

- 1. All dimensions are in millimeters.
- 2. Tolerance is ± 0.1 mm unless otherwise noted

5. PIN configuration

| NO. | Symbol | Function description |
|-----|--------|----------------------------|
| 1 | GND | Ground |
| 2 | DIN | Control data signal input |
| 3 | VDD | Power supply LED |
| 4 | DOUT | Control data signal output |

6. Recommended dimensions for PCB products



7. General description of product naming.

SKC 6812-RV

① ② ③ ④

| | | |
|-------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------|
| ① | ② | ③ |
| Series | IC series and current code | Internal coding |
| The default is to integrate the RGB chip with the IC in the 5.4x4.8x1.6mm package outline | Refers to the 68 series IC 12:12mA current version | RV:Represents an internal code |

8. Electrical parameters (Ta=25°C, VSS=0V) :

| Parameter | Symbol | Range | Unit |
|----------------------|--------|--------------|------|
| Power supply voltage | VDD | +3.7~+5.5 | V |
| Logic input voltage | VIN | -0.5~VDD+0.5 | V |
| Reverse Voltage | VR | 12 | V |
| Working temperature | Topt | -40~+85 | °C |
| Storage temperature | Tstg | -40~+85 | °C |
| ESD pressure(HBM) | VESD | 2K | V |
| ESD pressure(DM) | VESD | 200 | V |

9. Electrical/Optical Characteristics:

| Color | SKC6812-RV | |
|-------|-------------------------|----------------|
| | Dominate Wavelength(nm) | Luminance(mcd) |
| Red | 620-625 | 320-580 |
| Green | 520-525 | 815-1275 |
| Blue | 465-470 | 160-320 |

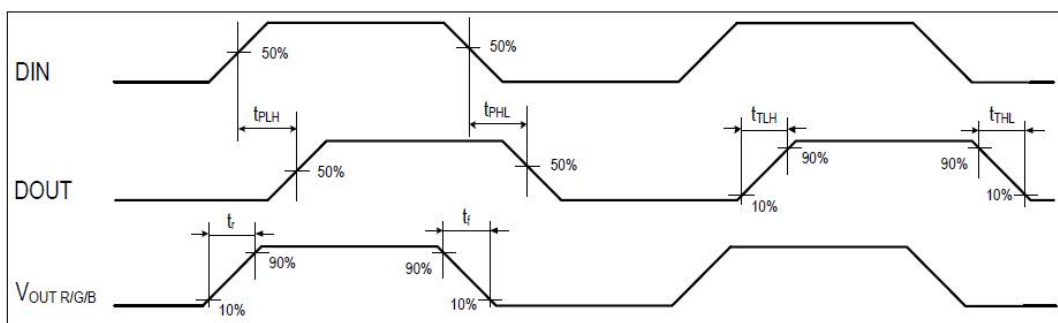
10. The IC electrical parameters (unless otherwise specified, TA=-20 ~ +70 °C, VDD=4.5 ~ 5.5V, VSS=0V):

| Parameter | Symbol | Min | Typical | Max | Unit | Test conditions |
|---------------------------------|--------|---------|---------|---------|------|-----------------|
| The chip supply voltage | VDD | --- | 5.2 | --- | V | --- |
| The signal input flip threshold | VIH | 0.7*VDD | --- | --- | V | VDD=5.0V |
| | VIL | --- | --- | 0.3*VDD | V | |
| The frequency of PWM | FPWM | --- | 4.0 | --- | KHZ | --- |
| Static power consumption | IDD | --- | 0.25 | --- | mA | --- |

11. Switching characteristics (Ta=25 °C):

| Parameter | Symbol | Min | Typical | Max | Unit | Test conditions |
|--------------------------------|--------|-----|---------|-----|------|-----------------------------------------------------------------------------------------------------------|
| The speed of data transmission | fDIN | --- | 800 | --- | KHZ | The duty ratio of 67% (data 1) |
| DOUT transmission delay | TPLH | --- | 100 | --- | ns | The earth load capacitance of the dout port is 30pf, and the signal transmission delay from DIN to dout |
| | TPHL | --- | 100 | --- | ns | |
| Dout conversion time | TTLH | --- | 15 | --- | ns | The earth load capacitance of the dout port is 30pf |
| | TTHL | --- | 24 | --- | ns | |
| Out R/B conversion time | Tr | --- | 200 | --- | ns | IOU R / B= 5mA, out R / B port connected with 200 Ω resistor to VDD in series, load capacitance to ground |
| | Tf | --- | 280 | --- | ns | |

Note 3, note 4 and note 5: as shown in the figure below:



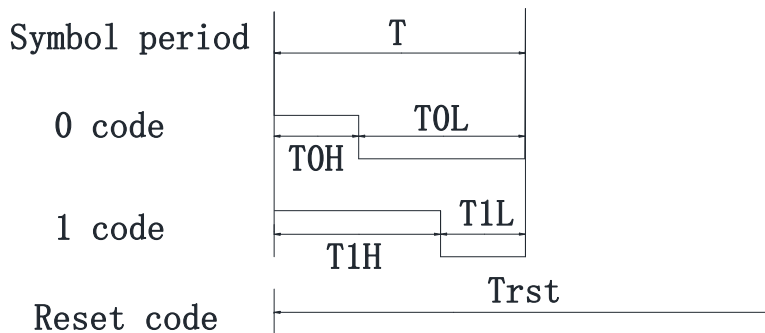
12. The data transmission time :

| Name | | Min. | Standard value | Max. | Unit |
|-------------|----------------------------|-------------|----------------|-------------|-----------|
| T | Code period | 1.20 | -- | -- | μs |
| T0H | 0 code, high level time | 0.20 | 0.30 | 0.40 | μs |
| T0L | 0 code, low level time | 0.80 | -- | -- | μs |
| T1H | 1 code, high level time | 0.65 | 0.75 | 1.00 | μs |
| T1L | 1 code, low level time | 0.20 | -- | -- | μs |
| Trst | Reset code, low level time | 200 | -- | -- | μs |

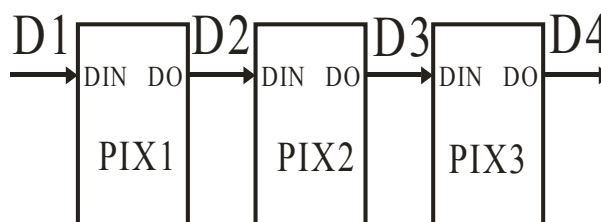
1. The protocol uses a unipolar zeroing code. Each symbol must have a low level. Each symbol in this protocol starts with a high level. The high time width determines the "0" or "1" code. .
2. When writing programs, the minimum symbol period is $1.2 \mu s$.
3. The high time of "0" code and "1" code should be in accordance with the stipulated range in the above table. The low time requirement of "0" code and "1" code is less than $20 \mu s$.

13. Timing waveform:

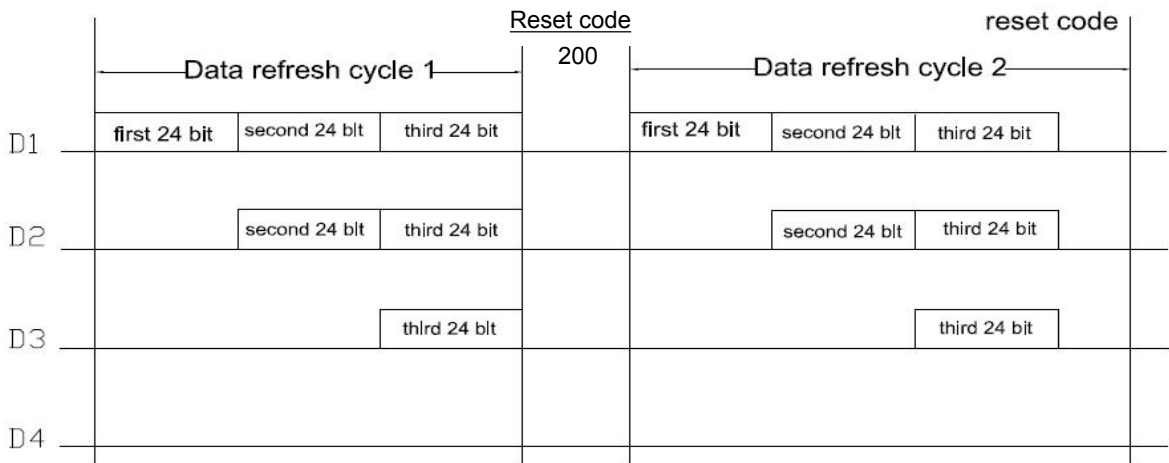
Input code:



Connection mode:



14. The method of data transmission:



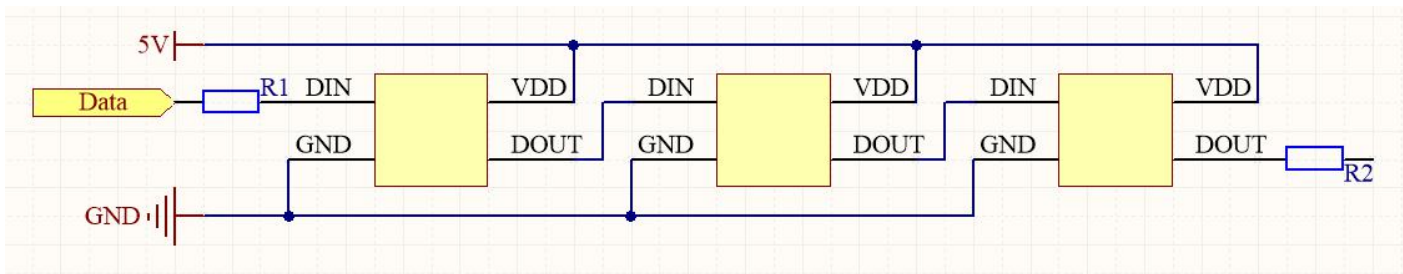
Note: the D1 sends data for MCU, D2, D3, D4 for data forwarding automatic shaping cascade circuit.

15. The data structure of 24bit:

| | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|
| G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | R7 | R6 | R5 | R4 |
| R3 | R2 | R1 | R0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |

Note: high starting, in order to send data (G7 - G6 -B0)

16. The typical application circuit:



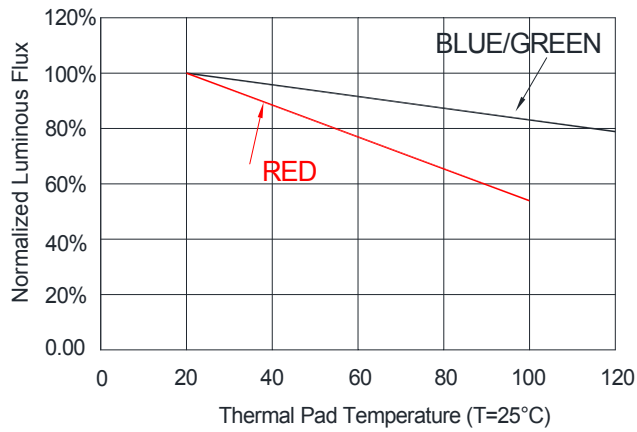
In the practical application circuit, the signal input and output pins of the IC signal input and output pins should be connected to the signal input and output terminals. In addition, in order to make the IC chip is more stable, even the capacitance between beads is essential back;

Application: used for soft lamp strip or hard light, lamp beads transmission distance is short, suggested in signal in time the clock line input and output end of each connected in series protection resistors, R1=R2 of about 500 ohms.

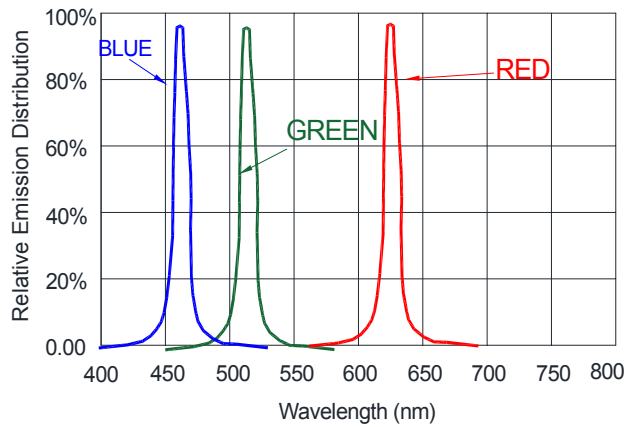
Application: for module or general special-shaped products, lamp beads transmission distance is long, because of different wire and transmission distance, in the signal in time clock at both ends of the line on grounding protection resistance will be slightly different; to the actual use of fixed;

16. Standard LED Performance Graph:

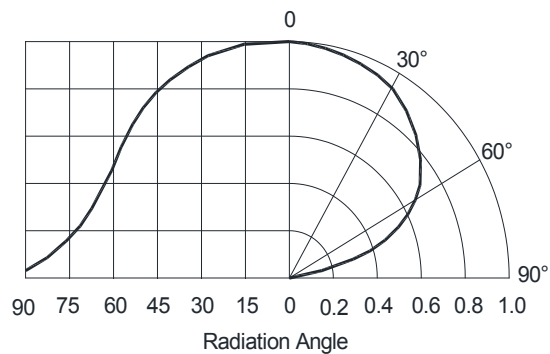
Thermal Pad Temperature vs. Relative Light Output



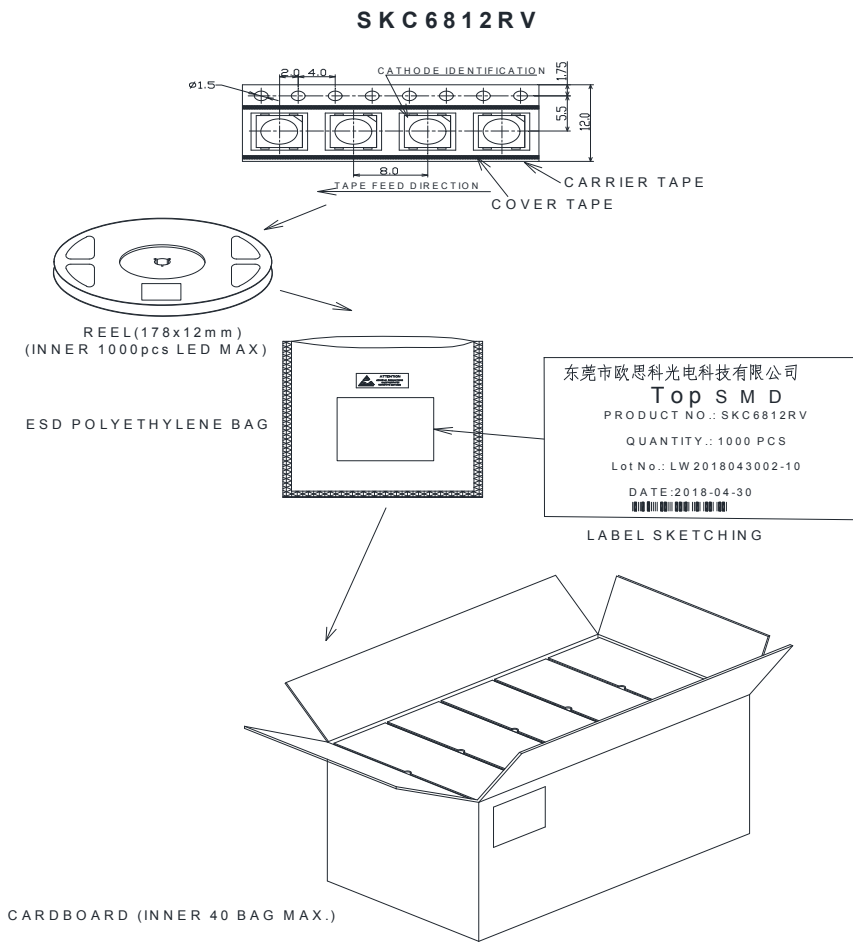
Wavelength Characteristics



Typical Radiation Pattern 120°



17. Packaging Standard:



19. Reliability Test :

| NO. | Test item | Test Conditions | Reference | Criterion |
|-----|----------------------------------------|------------------------------------------------------------------|--------------------------|-----------|
| 1 | Thermal Shock | 100 ± 5° C ~ -40° C ± 5° C 15min~15min 100 cycles | MIL-STD-202G | 0/22 |
| 2 | High Temperature Storage | Ta= +100° C 1000hrs | JEITA ED-4701 200 201 | 0/22 |
| 3 | Low Temperature Storage | Ta= -40° C 1000hrs | JEITA ED-4701 200 202 | 0/22 |
| 4 | High Temperature High Humidity Storage | Ta=60° C RH=90% 1000hrs | JEITA ED-4701 100 103 | 0/22 |
| 5 | Temperature Cycle | -40° C~25° C~100° C~25° C 30min~5min~30min~5min 100 cycles | JEITA ED-4701 100 105 | 0/22 |
| 6 | Resistance to Soldering Heat | Tsld = 260° C, 10sec. 2 times | JEITA ED-4701 300 301 | 0/22 |
| 7 | Room temp Life Test | 25° C, IF: Typical current , 1000hrs | JESD22-A 108D | 0/22 |

Criteria for Judging the Damage:

| Item | Symbol | Test Condition | Limit | |
|------------------------------|--------|------------------------|----------------------------------|-----|
| | | | Min | Max |
| Luminous Intensity | IV | DC=5V, Typical current | Init. Value*0.7 | --- |
| Resistance to Soldering Heat | --- | DC=5V, Typical current | No dead lights or obvious damage | |